High Surface Area Iridium Anodes and Melt Containers for Molten Oxide Electrolysis, Phase II

Completed Technology Project (2010 - 2012)

Project Introduction

Direct electrochemical reduction of molten regolith is the most attractive method of oxygen production on the lunar surface, because no additional chemical reagents are needed. The process is proven on a laboratory scale, but the cathode-anode system and melt containers need to be improved for practical applications. The electrochemical processing of molten oxides requires high surface area inert anodes. Such electrodes need to be structurally robust at elevated temperatures (1400-1600

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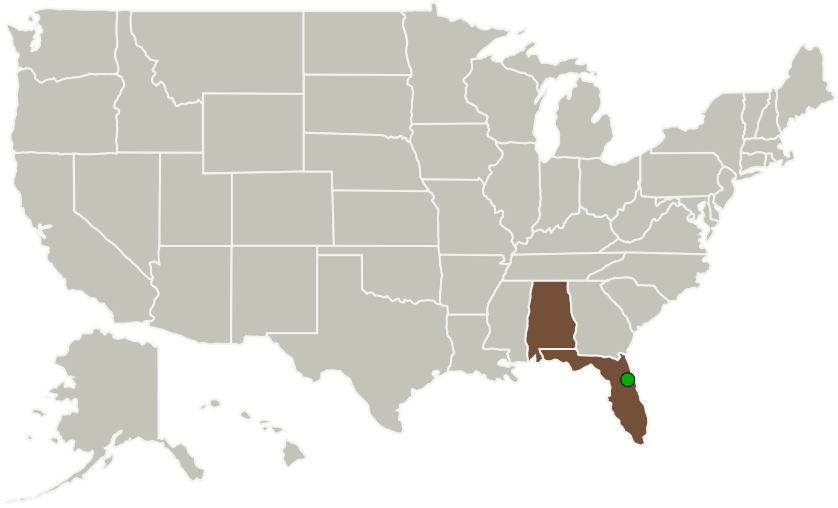
C), resistant to thermal shock, have good electrical conductivity, resistant to attack by molten oxide (silicate), electrochemically stable, and support high current density. Iridium is a proven material for this application. Innovative concepts for large scale, high surface area iridium anodes and long life, self-heating containers for the melts are proposed. The result of this program will be the development, manufacture, and test of high surface area iridium anodes and melt containers for molten oxide electrolysis to produce oxygen.

Primary U.S. Work Locations and Key Partners



Organizations Performing Work	Role	Type	Location
Kennedy Space Center(KSC)	Supporting Organization	NASA Center	Kennedy Space Center, Florida

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Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

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Primary U.S. Work Locations	
Alabama	Florida

Project Transitions

January 2010: Project Start

July 2012: Closed out

Closeout Documentation:

- Final Summary Chart*(https://techport.nasa.gov/file/139066)*

Project Management

Program Director:

Jason L Kessler

Program Manager:

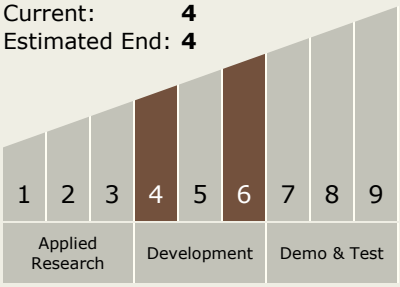
Carlos Torrez

Principal Investigator:

Angela D Hattaway

Technology Maturity (TRL)

Start: **6**
Current: **4**
Estimated End: **4**



Technology Areas

Primary:

- TX07 Exploration Destination Systems
  - TX07.1 In-Situ Resource Utilization
    - TX07.1.3 Resource Processing for Production of Mission Consumables

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Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System